A Vision for Information Management in the Upstream Oil and Gas Industry, Western Canada

WORK IN PROGRESS

The VIPIR Project

Volumetric and Infrastructure Petroleum Information Registry

An initiative of the Alberta Ministry of Resource Development
Alberta Energy and Utilities Board (EUB)
Alberta Department of Resource Development (DRD)]
in cooperation with industry partners.

June 6, 2000

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The Context

What is Information Management?

In this document, information management refers to the **collection, use, storage, and dissemination of data and information.** [1]

The VIPIR project deals with petroleum-related data and information.[2] Although the Ministry of Resource Development and Alberta's upstream oil and gas industry are expected to be the primary users of this material, it also has value for other jurisdictions and agencies.

What is the Upstream Oil and Gas Industry?

Alberta's oil and gas resources lie within the Western Canadian Sedimentary Basin, which includes parts of Saskatchewan and British Columbia. The **upstream** sector of the oil and gas industry deals with the **exploration, production, processing,** and **delivery-to-pipeline** of petroleum products. It includes exploration, production and fully integrated companies; drilling contractors; and various scientific, technical and service companies.[3] The latter include software vendors and production accountants.

The VIPIR project deals with the development of information management processes for Alberta's upstream industry. Since these processes have implications for the entire basin, the project plan provides for consultation and communication with other jurisdictions.

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[1] This is consistent with the definition used by the Alberta government's Office of the Chief Information Officer, which defines information resource management as "the practice of effectively using technology and information to support an organization's core businesses." *Source: CIO web site at <www.gov.ab.ca/cio/irm_overview.html> September 25, 1999.*

[2] The terms data and information are often used interchangeably, although they have specific meanings within the context of information management. The following definitions are provided by Kenneth J. Laudon and Jane P. Laudon in their book *Essentials of Information Systems: Organization and Technology*, 2nd ed. (Upper Saddle River, New Jersey: Prentice-Hall, Inc., 1997).

data: "streams of raw facts representing events occurring in organizations or the physical environment before they have been organized and arranged into a form that people can understand and use" (p. 527)

information: data that has "been shaped into a form that is meaningful and useful to human beings" (p. 530)

[3] Source: Bob Buchanan, "Report on Employment in the Canadian Petroleum Industry" (Petroleum Communication Foundation, December 1994), p. 1. Buchanan defines the **downstream** sector as "pipeline companies, refineries, natural gas distribution utilities, wholesale petroleum product producers, service stations, and petrochemical producers."

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The Role of the Alberta Ministry of Resource Development

Canada is the world's third-largest producer of natural gas and the eleventh-largest producer of crude oil. Over 96% of our gas and oil comes from the Western Canadian Sedimentary Basin. Over 82% is produced here in Alberta.

In 1997, the upstream oil and gas industry directly employed about 83,000 people and supported 130,000 related goods-and-services jobs. Total industry employment– including the downstream sector– was 447,000. Industry payments to governments (crown royalties, bonus payments and income taxes) totalled $8 billion.

Source: Canadian Association of Petroleum Producers (CAPP) web site at <www.capp.ca> September 1999.

A strong, efficient, internationally competitive oil and gas industry contributes to a healthy economy and helps to ensure the continuing prosperity of Albertans.

Although the process of resource extraction is more difficult in our province than in some parts of the world, Alberta offers many incentives for oil and gas companies to do business here. Alberta has rich reserves of petroleum resources. The Ministry of Resource Development works hard to make Alberta a good place to do business. The Alberta Advantage provides a stable political environment, a highly skilled workforce, and a competitive fiscal regime.

Alberta's fiscal regime and regulatory and administrative infrastructures are both more flexible and more complex than other jurisdictions'. A flexible regime makes it possible for Alberta to offer fiscal incentives (like the gas cost allowance or the enhanced oil recovery royalty relief program) that are attractive to resource owners. Such incentives must be regulated and controlled, which means that flexibility comes at the price of more complex and difficult administrative systems.

The effects of complex infrastructure can be mitigated by effective information management strategies. Innovative, efficient information management can provide Alberta with a sustainable strategic advantage relative to other jurisdictions. It can help our oil and gas industry maintain a competitive edge within the global economy.

Sustaining Alberta's competitive advantage is an ongoing, incremental process. Better management of petroleum information is an important building block, and the VIPIR project is an important first step.[4]

The Ministry and Information Management

> **To remain sustainable economically, the Canadian oil and gas industry needs to be efficient and competitive on a global scale. It will take investment and innovation to meet ever-rising environmental expectations, regulatory requirements and the needs of present and future generations of consumers.**
>
> **Robert Bott, *Our Petroleum Challenge* (Calgary: Petroleum Communication Foundation, 1999), p. 88.**

Effective resource administration and resource development depend on good information and innovative information management. Good information is critical for the Ministry of Resource Development (that is, for the EUB and the DRD) *and* for the oil and gas industry. The **Alberta Energy and Utilities Board** (EUB) relies on good information to effect fair regulation, ensure public safety, and address conservation and environmental issues related to responsible, sustainable resource development. The **Department of Resource Development** (DRD) needs good information to manage the disposition of mineral rights; assess, levy and collect revenue; and develop sound policy and efficient business processes. The **petroleum industry** depends on good information for investment decision-making, business negotiations, production management, forecasting, and financial planning.

Improving the quality of petroleum-related information and information management provides a significant competitive advantage that can help sustain the long-term viability of our oil and gas sector. Valid information and effective information management improve the decision-making abilities of both industry and government. They help make Alberta a good place to do business. They foster petroleum industry investment. They help to ensure that the people of Alberta gain maximum benefits from the development of the province's petroleum resources, and that these benefits can be sustained for future generations.

Effective information management adds value for the province, the Ministry, and our upstream petroleum industry. It adds value for exploration, development, drilling, production, processing and distribution companies. It adds value for government departments and agencies from multiple jurisdictions—and for stakeholders throughout the Western Canadian Sedimentary Basin.

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[4] For details about the VIPIR project, please see pages 4 and 9.

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With the VIPIR project, the Alberta Ministry of Resource Development has taken on the role of catalyst. The ministry anticipates that the information management processes developed through VIPIR will be so effective that other stakeholders will want to use them. The result will be new opportunities for cooperation—and benefits for Canada's oil and gas sector as a whole.

Our Vision

Our vision for information management ... .

Outstandingly effective, efficient information management will be a cornerstone of a healthy Albertan economy and a competitive Canadian oil and gas industry. In the Western Canadian Sedimentary Basin, all stakeholders will have easy, centralized access to safe, accurate, comprehensive, and timely petroleum-related information. The exchange of information within the upstream petroleum industry and between industry and government will be instantaneous and totally reliable.

How We'll Get There

The Volumetric and Infrastructure Petroleum Information Registry (VIPIR) project is an important first step toward this "ideal future." VIPIR will help to create the best possible environment for information management by:

- building a shared information **registry** that supports the production and processing industries while meeting the ministry's own demands for regulatory, resource and revenue management information;
- streamlining and re-engineering the **processes** used to record registry data;
- facilitating the electronic interchange of data and the use of appropriate modern **technology**;
- building **proficiency** among government and industry employees so that they can access and use registry data to maximum advantage.

While VIPIR's mandate is limited to the Alberta Ministry of Resource Development—in collaboration with Alberta's petroleum production and processing industry—the benefits of the project can be shared beyond our province. Building better information management in

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Alberta can catalyze cooperation, save costs, improve efficiency, and enhance the global competitiveness of the entire Canadian upstream oil and gas industry.

VIPIR's information management package—the shared information registry and the improved business processes it facilitates—will result in immediate efficiency gains for industry and government. These alone will justify the cost of the project. They will also result in better service, better policy, better data, and more timely access to information.

The shared information registry will make it possible to manage information on the basis of **data flows** rather than restrictive, paper-based forms. In the short term, this will facilitate the consolidation and streamlining of two key business processes:

1) the administration of the oil- and gas-related statistical reports (S reports) currently managed by the EUB on behalf of ministry and industry stakeholders; and

2) the administration of the owner activity statements (OAS) required by the DRD.

In the long term, the registry will create the potential for more significant process re-engineering. It will provide **opportunities for the upstream industry** to redesign and improve its own business processes in ways that will result in even greater cost savings and efficiency gains.

Principles and Methods

The Ministry of Resource Development is committed to working in **partnership with the petroleum industry** to develop solutions that will benefit both industry and government. The VIPIR project is designed with this commitment in mind. Major stakeholders are represented on the project's steering and advisory committees. The project's working teams include both industry and ministry representatives. Information-sharing and consultation with industry are routine project activities.

The goals of the VIPIR project demonstrate the ministry's commitment to continual improvement and to a consultative, collaborative approach. The project specifically addresses three major obstacles identified by the oil and gas industry: provisional assessments, reporting discrepancies that unduly favour the Crown (Crown-favour volumes), and compliance penalties. It includes checks and balances to ensure that the expected benefits are sufficient to warrant the trouble and cost. It includes a commitment to training and consultation—to create an environment in which industry and ministry partners *can* succeed.

VIPIR provides **new opportunities** to streamline operations and save costs for industry and government. In doing so, it draws on lessons learned from past experience and builds on existing strengths. For example, good petroleum information is currently available in Alberta. VIPIR builds on this by providing better tools for information-sharing and for collecting and capturing data. It makes access cheaper and easier. It creates opportunities for cooperation

and for process re-engineering. It ensures that information is available right when it is needed—for industry-to-industry or industry-to-government communication.

VIPIR takes existing industry standards (e.g., PPDM, GISB standards for pipeline transmission to the US) into account and ensures that its own data standards are compatible—unless there is a valid reason for different standards. It works with industry to create new standards when none exist (e.g., for upstream processes such as shippers' splits and allocations to well owners).

A Shared Information Registry: A Look into the Future

Outstandingly effective, efficient information management is achieved...

....through the creation of a shared information registry. The registry is maintained under the jurisdiction of a reputable organization that is recognized by regulatory and industry stakeholders. It is governed by duly appointed stakeholder representatives who make collaborative, consensus-based operating decisions.

The registry provides a **central source** of data: this ensures that everyone has access to the same information at the same time. It guarantees standard definitions of data. This, in turn, ensures consistency in reporting and analysis, since all stakeholders are using a **single, accepted data source**.

Standardized procedures are used to ensure that registry **data is valid**. (That is, data is subjected to system controls and front-end editing procedures before it is posted to the registry.) This minimizes errors, precludes the need for reconciliation, and saves time and money, since all stakeholders accept the registry as the authoritative data source.

All petroleum-related data—including validated volumetric and infrastructure data—is stored in one place and posted to the registry as it is generated. This facilitates **immediate access** and eliminates the stress of "chasing information."

All stakeholders are **proficient users** of the data in the registry. They can link and download information to meet their particular requirements, without the intervention of outside agencies. Both current and archival information are available "as required," so there is no need to generate unnecessary paper reports.

Data flow and reporting systems are founded on a **manageable calendar** with reasonable deadlines and approved **dates of record**. Deadlines are determined through a

collaborative process and meet the reporting needs of industry and government stakeholders.

The registry provides a **notification system** designed to alert industry stakeholders to errors *before* they are recorded. Stakeholders have the opportunity to make corrections before provisional assessments and penalties are imposed. This helps to avoid amendments and regulatory interventions.

Registry data is collected according to **common standards** that are understood and used by all stakeholders. Standardization ensures that the **same data always means the same thing**, no matter who is using it. It also ensures that data **can be shared and compared across different interfaces**. This means that no matter what software or hardware users have, they can access and use registry data.

Registry data is stored in its most **granular** form—as discrete (rather than derived), validated, standardized elements. This precludes mathematical errors. It ensures that data can be combined in a variety of ways for a variety of needs, so that new applications—responding to changing business practises—can be readily and economically built.

Registry data can be analyzed online—using current, **state-of-the-art technology**.

The Attributes of a Shared Information Registry

The information in the proposed registry will be:

- shareable. (Information that falls within the public domain will be openly shared. Other information will be subject to entitlement rules that are negotiated and approved by all stakeholders. Interfaces to other data repositories or other data segments will be clearly defined. For example, a production company could import infrastructure data from the registry directly into its own, in-house, business analysis models.)
- affordable. (Sharing information will reduce costs for government and for small, medium-sized, and large oil and gas companies. Appropriate cost-sharing formulas will be negotiated.)
- secure to entitled stakeholders. (Private and proprietary information will be protected.)
- standardized and supported by universally understood, consistent definitions. (Standards will ensure the data is comparable. This will improve industry-to-industry communication. It will also facilitate industry decision-making with regard to investments, partnerships, joint ventures, and strategic alliances.

(The information in the proposed registry will be:)

- Standardizing data-management conventions will make it easier to share and compare data across systems—within the ministry and between the ministry and the oil and gas industry.)
- granular (rather than derived), except where a specific benefit for nongranular data has been identified and proven. (Storing data as granular elements will avoid calculation errors. It will provide **flexibility**, since granular data elements can be sorted or combined in various ways for various purposes. It will also **facilitate adaptation** to changes in the business environment. For example, if new technology creates new kinds of data, granular elements can be incorporated without the need for major systems changes.)
- available from a single source which all stakeholders use willingly and accept as valid. (Improving ease of access to data will preclude duplication of effort, eliminate complexity, and save time and money for industry and government.)
- comprehensive (within approved bounds) for primary stakeholders. (The registry will include information required by the ministry for revenue collection and regulatory purposes. It will also include a broader spectrum of petroleum-related information to meet the needs of industry stakeholders. Some of this information may be useful for other jurisdictions, industries or disciplines. Although these users may access registry information, it will not necessarily be comprehensive from their perspective.)
- valid. (System controls will ensure that data posted to the registry is as reliable as it can be. Although system controls cannot verify the accuracy of raw data submissions, this will reduce errors and minimize the need for amendments, re-assessments and other forms of rework,)
- integrated. (The types of data which are currently collected by different entities—DRD, EUB, industry, etc.—will be available from a single, centrally accessible source. This will facilitate the integration of business processes and prompt, accurate communication between stakeholders.)
- accessible by electronic means. (Users of the registry will follow clear, straightforward procedures to access data. Appropriate training and "help" facilities will provide user support.)
- scalable and expandable in terms of size and functionality. (The creation of a shared information registry has implications for the planning and development of transportation networks, software systems, and a host of services and industries related to the petroleum sector. The registry will be designed to accommodate change and expansion. This will allow the ministry, the industry and other stakeholders to take advantage of future opportunities, to modify business systems, and to improve processes, as required.)

(The information in the proposed registry will be:)

- timely. (Data will be created at the time and point of origin. Users will have access when they need it, without the need to wait for data to be validated or processed by others.)
- governed, housed and maintained by a recognized authority.
- safe. (Registry data will be protected with fail-safe disaster recovery systems.)

Expected Results

A shared information registry will help to create the best possible environment for information management in Alberta's upstream oil and gas industry. This will:

- save money for government and industry;
- provide a foundation for the re-engineering and improvement of government and industry business processes;
- position Alberta as the best place to do petroleum-related business;
- add value at other levels (related industries) and for other sectors (transportation) and jurisdictions (municipal governments, other provinces);
- catalyze cooperation with industry and with other jurisdictions.

Ultimately, it will improve the efficiency and competitiveness of the whole Western Canadian Sedimentary Basin.

The VIPIR Project

Background

The Volumetric and Infrastructure Petroleum Information Registry (VIPIR) project was launched by the Ministry of Resource Development in the spring of 1999. Its purpose is to implement the key recommendations of the Royalty and Related Information Review (RRIR)—an industry-led initiative announced by the Minister of Energy[5] in the fall of 1997.

RRIR was directed by a joint industry/ministry steering committee chaired by Stephen Savidant of Canadian Hunter Exploration Limited. Charlie Fischer of Canadian Occidental Petroleum Ltd. and David Laws of Mutiny Oil and Gas Ltd. rounded out the industry

[5] The Ministry of Energy was renamed the **Ministry of Resource Development** in May 1999.

complement on the steering committee. The deputy minister of the Department of Energy and the chair of the Alberta Energy and Utilities Board represented the Ministry of Energy.[6]

The RRIR steering committee established a task force whose members were chosen to represent both industry and government views. The task force was charged with investigating industry concerns about the cost, complexity, and adequacy of the regulatory and reporting requirements of the existing gas royalty regime. It concluded that, although reasonably efficient, cost-effective administrative processes were already in place, there was still room for improvement.

The initial focus of the Royalty and Related Information Review was the gas royalty regime. However, in the course of investigations, the task force identified a significant **opportunity to improve the way petroleum-related** (not just gas-related) **information is collected, shared, and used** by industry and government. The focus of the review was broadened as a result. Industry participants identified eight policy- and information-related issues. More than 40 suggestions for change were documented. The best of these were consolidated into three recommendations for improving the rules of the oil and gas business in ways that would benefit both industry and government stakeholders.

The task force recommendations (published in a report released in January 1998) were to:

1) repair current problems with the gas royalty regime;
2) streamline the capture of upstream production and processing data;
3) "develop a registry containing key oil and gas information accessible and shareable by the ministry and industry."[7]

These recommendations were endorsed by the Small Explorers and Producers Association of Canada (SEPAC) and the Canadian Association of Petroleum Producers (CAPP).

The results of the task force review were widely circulated and industry stakeholders were invited to provide feedback and comments. On the basis of industry input, some of the original recommendations were revised, regrouped, or dropped altogether. New recommendations were developed (to incorporate feedback from industry) and published in the report addendum released in June 1998. Since that time, the Ministry has continued its investigations and consultations to establish a practical, feasible implementation plan.

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[6] Bob King served as the Department of Energy deputy minister from 1997 to March 31, 1998, when Ken Smith assumed this role (and a position on the RRIR steering committee). Céline Bélanger served on the steering committee until July 31, 1998, when Neil McCrank took over as EUB chair.

[7] Royalty and Related Information Review, *Task Force Report, January 26, 1998*, p. 98.

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In the spring of 1999, the Minister gave his approval for the **VIPIR project**. Building a shared information registry (the third RRIR recommendation) has since become the major focus of the project. The registry provides the opportunity to streamline and re-engineer business processes (the second RRIR recommendation) in ways that add value for upstream oil and gas stakeholders throughout the Western Canadian Sedimentary Basin. The information management component of the project deals with the implementation of these two recommendations.

The RRIR task force also recommended a number of improvements related to the gas royalty regime. The regime-related changes will be handled as separate initiatives outside scope of VIPIR. Implementation will occur in consultation with industry.

Project Scope

It is important to note that, while the primary focus of RRIR was the natural gas royalty regime, the VIPIR project deals with the upstream oil and gas industry.

VIPIR: Information Management

the registry and related process re-engineering

A first step for this component of the VIPIR project was the completion of **proof of concept** work begun by the ministry in early 1999. The purpose of this work was twofold. It was intended to confirm:

1. that the ministry's information needs could indeed be met through the streamlined data capture (namely, the consolidation of S and OAS reports) recommended by the RRIR task force; and
2. that implementing the recommended streamlining would have no adverse effect on industry business processes.

The ministry released its *Position Paper on Volumetric Consolidation* on April 19, 1999. This document, which is informally called the *Proof of Concept: Phase I*, was vetted within the ministry, by the VIPIR project steering committee, and by the government liaison committee of the Canadian Association of Petroleum Production Accountants (CAPPA). Its conclusions were then validated by a working group of ministry and industry representatives. The working group was responsible for:

- substantiating the original stakeholder cost/benefit analysis; and
- determining if the data-capture model recommended by the RRIR task force was viable.

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- substantiating the original stakeholder cost/benefit analysis; and
- determining if the data-capture model recommended by the RRIR task force was viable.

The findings of the working group were reported in the *Volumetric Consolidation Proof of Concept: Phase II* report released on June 30, 1999. This document identified alternative approaches to the RRIR recommendation that data-capture processes be streamlined by rationalizing the requirements for the EUB's statistical reports (S reports) and the DRD's owner activity statements (OAS forms). When this recommendation was first proposed, it was believed that OAS and S reports could be consolidated into a single "product allocated to wells statement" (PAWS). The basis of this consolidation would be a new ownership registry—the Crown Royalty Interest Registry (CRIR).

The proof of concept work demonstrated that the proposed ownership-interest registry was not feasible. This was because downstream processing changes the characteristics of original well products. As a result, the concept of allocations to owners was neither as cost-effective nor as strategic as it had first appeared, and the proposal to design an ownership registry was dropped.

The proof of concept work also demonstrated that the goal of streamlining data processing (the second recommendation of the RRIR task force) could be accomplished by building a shared information registry (RRIR's third recommendation).[5] As a result, these two components of the VIPIR project are being addressed in a single business case.

Because of the technical (systems development) requirements and the potential impact on ministry and industry business processes, the project strategy includes developing a conceptual design and a prototype for the proposed information registry. This work (directed by the project's technical leader, John Finlaison) defines the data requirements for the registry. The business case (prepared by a team directed by David Breakwell) provides a cost-benefit analysis for the registry and for the re-engineered business processes it enables. The business case will provide the basis for an executive decision about whether or not the Ministry of Resource Development will proceed with the information-related component of the VIPIR project.

In its inaugural phase, the scope of the information management phase of the VIPIR project is restricted to volumetric[6] and infrastructure information. However, the proposed shared information registry has the potential for much broader application.

[5] The "shared information registry" and the "ownership registry" (Crown Royalty Interest Registry") were separate components of the RRIR recommendations.

[6] The term volumetric is used to refer to measures of volume, weight, and heat.

The findings of the working group were reported in the *Volumetric Consolidation Proof of Concept: Phase II* report released on June 30, 1999. This document identified alternative approaches to the RRIR recommendation that data-capture processes be streamlined by rationalizing the requirements for the EUB's statistical reports (S reports) and the DRD's owner activity statements (OAS forms). When this recommendation was first proposed, it was believed that OAS and S reports could be consolidated into a single "product allocated to wells statement" (PAWS). The basis of this consolidation would be a new ownership registry—the Crown Royalty Interest Registry (CRIR).

The proof of concept work demonstrated that the proposed ownership-interest registry was not feasible. This was because downstream processing changes the characteristics of original well products. As a result, the concept of allocations to owners was neither as cost-effective nor as strategic as it had first appeared, and the proposal to design an ownership registry was dropped.

The proof of concept work also demonstrated that the goal of streamlining data processing (the second recommendation of the RRIR task force) could be accomplished by building a shared information registry (RRIR's third recommendation).[8] As a result, these two components of the VIPIR project are being addressed in a single business case.

Because of the technical (systems development) requirements and the potential impact on ministry and industry business processes, the project strategy includes developing a conceptual design and a prototype for the proposed information registry. This work (directed by the project's technical leader, John Finlaison) defines the data requirements for the registry. The business case (prepared by a team directed by David Breakwell) provides a cost-benefit analysis for the registry and for the re-engineered business processes it enables. The business case will provide the basis for an executive decision about whether or not the Ministry of Resource Development will proceed with the information-related component of the VIPIR project.

In its inaugural phase, the scope of the information management phase of the VIPIR project is restricted to volumetric[9] and infrastructure information. However, the proposed shared information registry has the potential for much broader application.

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VIPIR: Gas Royalty-Regime Changes

The RRIR task force identified a number of recommendations to improve business rules related to the gas royalty regime. The regime-related changes will be handled as separate initiatives outside the scope of VIPIR. Implementation will occur in consultation with industry.